CS 376	**Operating Systems**	Test 3
Name:	Fall 2001	Max Pts: 49

Important: This is an open book test. You can use any books, notes, or paper. *Do not log into the computer, or use any communications device during the test.* Any calculations and rough work can be done on the back side of the test pages. You will lose five points for not writing your name.

1. [10 pt] A machine has memory access time of 100ns. On an average, 1 access in 4200 causes a page fault. The secondary storage attached to the system is a disk, with an average seek time – across requests – of 12ms and an average latency of 8ms. The transfer time per sector, including overheads, is 1ms. On an average, 1 in 10 frames in memory has its dirty bit set. Compute the effective memory access time for this system. Express the degradation in performance as a percentage.

2. [6 pt] I routinely transfer files across machines, using any of the file copy programs such as `rcp`, `scp`, and `ftp`. Once a file arrives at its destination, I can never be sure if I received the file in full or whether a network problem made the machine hand up. Can you suggest a way to find out how to check for the fact that the number of records received is correct? Use Unix as your context operating system. You do not have to write code but a general reference to the type of functions or system calls will be good.

3. [15 pt] If FIFO page replacement is used with 3 page frames, how many page faults will occur with the reference string

8 4 1 3 9 8 2 6 8 4 5 1 5 4 2 7 2 1 8

if the frames are initially empty. Now repeat this problem for OPT, LRU and second chance algorithm. How will it perform with a window size of 4 under the working-set algorithm (assume unlimited number of frames available for working set algorithm but working set window size is 4)?

4. [18 pt] Disk requests come in to the disk driver for cylinders 37, 200, 47, 172, 190, 227, 133, 200, 108, 6, 96, and 52, in that order. A seek takes 2 msec per cylinder moved. The arm is currently at cylinder 106. The cylinders are numbered from 0 to 255. How much seek time is needed for

   (a) FCFS scheduling

   (b) SSTF scheduling

   (c) Elevator algorithm (initially moving away from cylinder 0)

   (d) C-SCAN scheduling (initially moving away from cylinder 0) satisfying requests as the head moves away from cylinder 0

   (e) LOOK scheduling (initially moving towards cylinder 0)

   (f) C-LOOK scheduling (initially moving towards cylinder 0) satisfying requests as the head moves away from cylinder 0